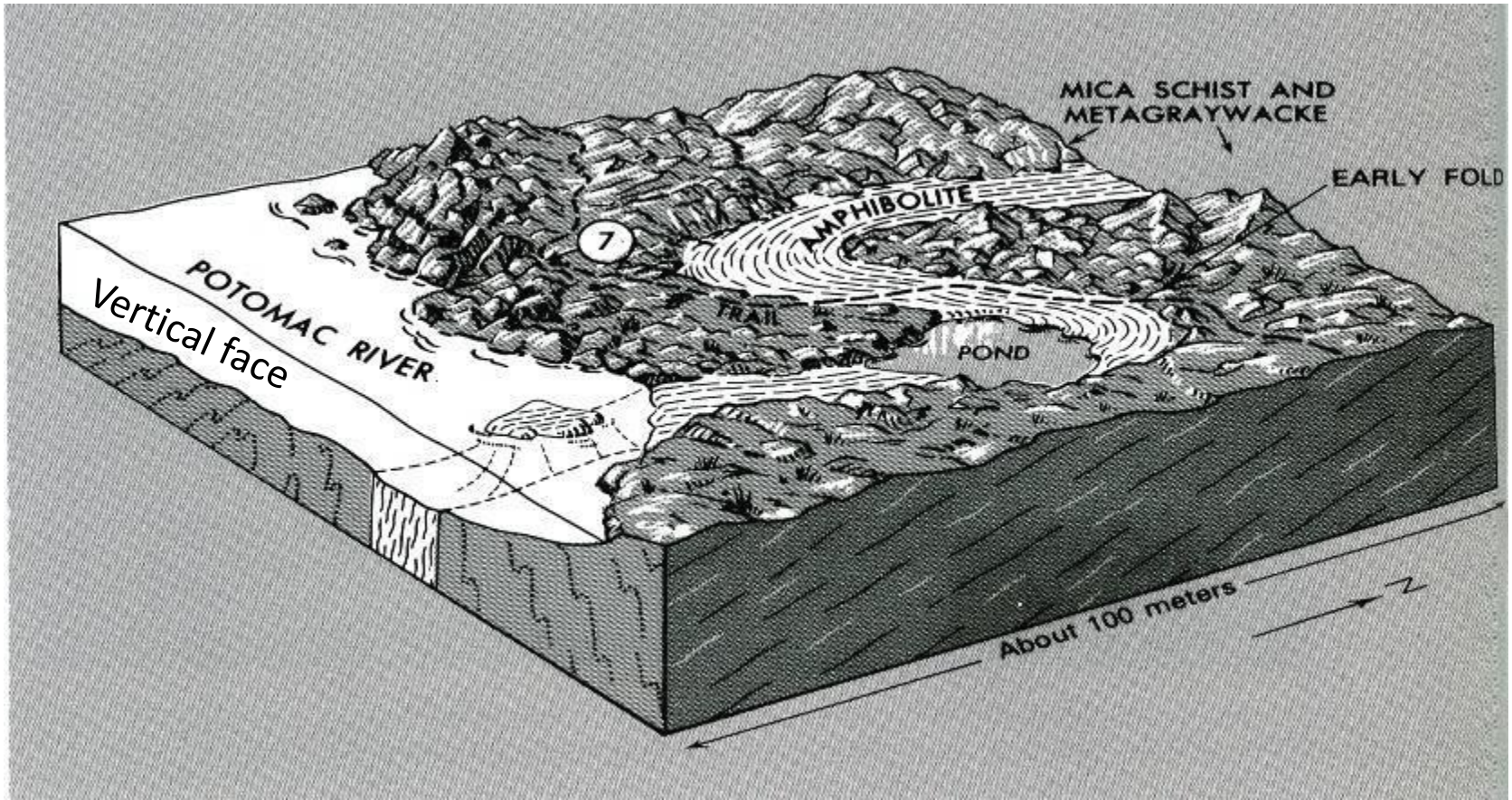
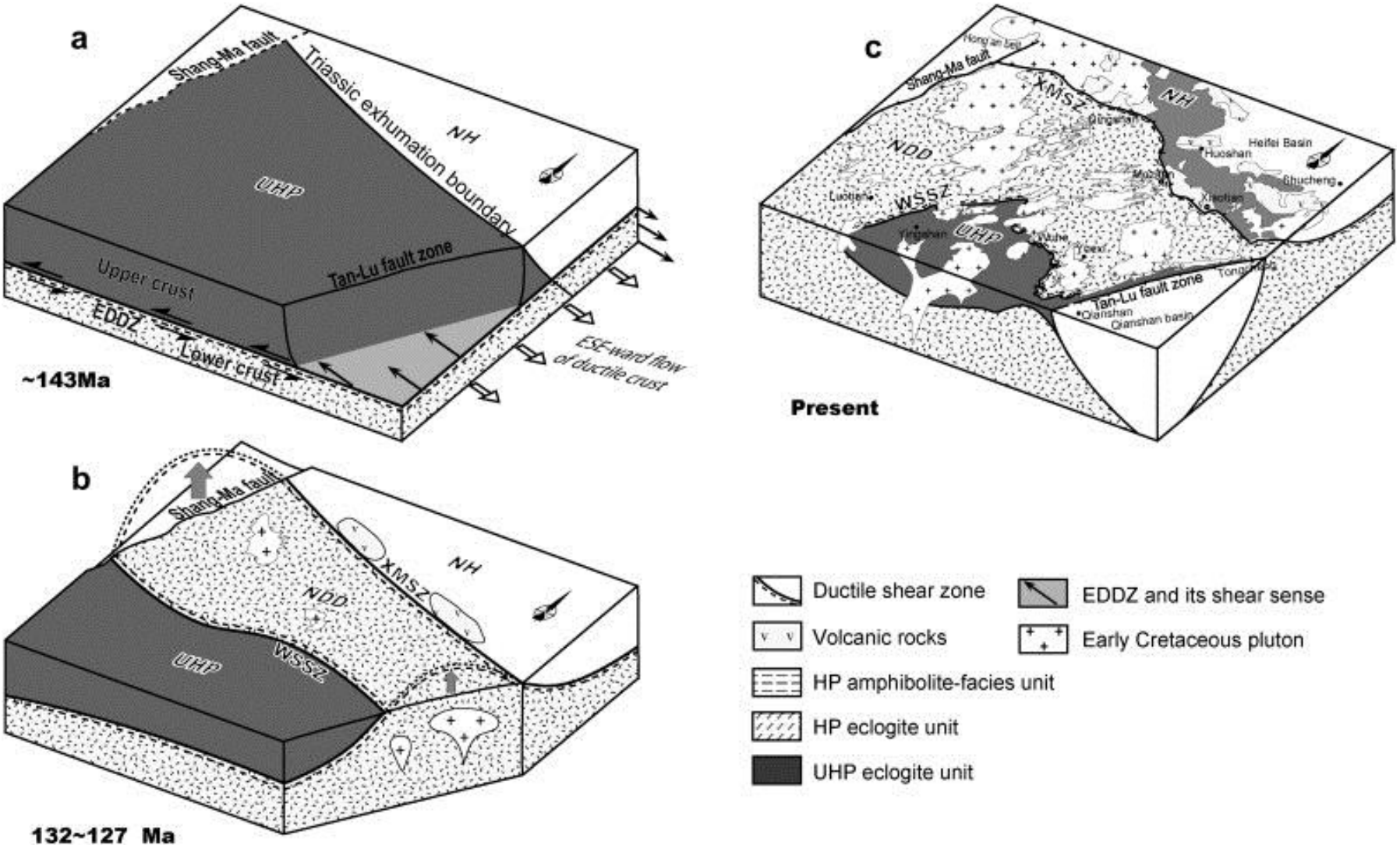
Lab 2 Block diagram showing folds and a fault

Block Diagram

- One of the best ways to show structures in 3 dimensions



Block Diagram

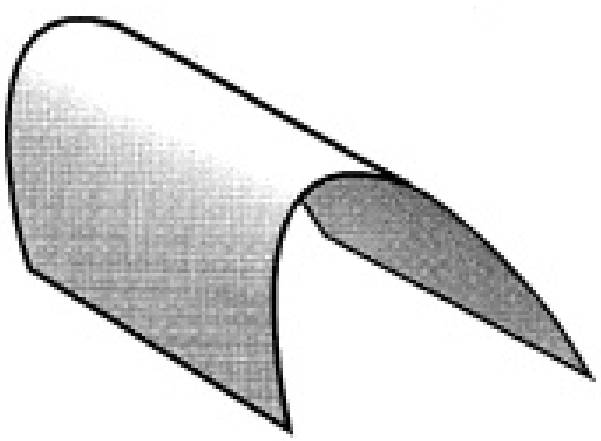


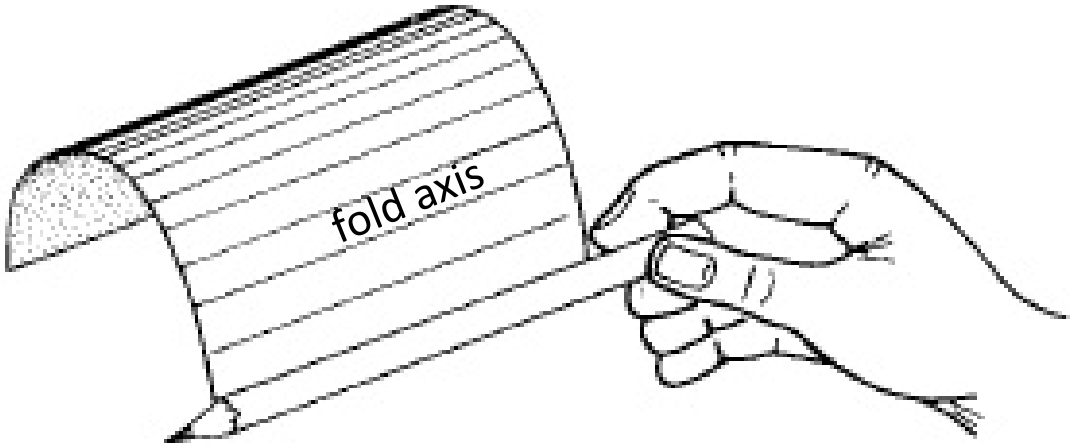
Cylindrical fold

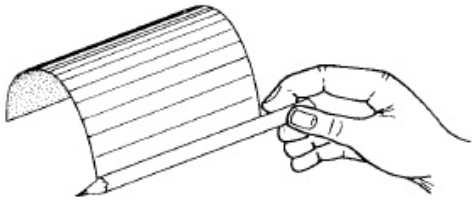
Cylindrical fold surface

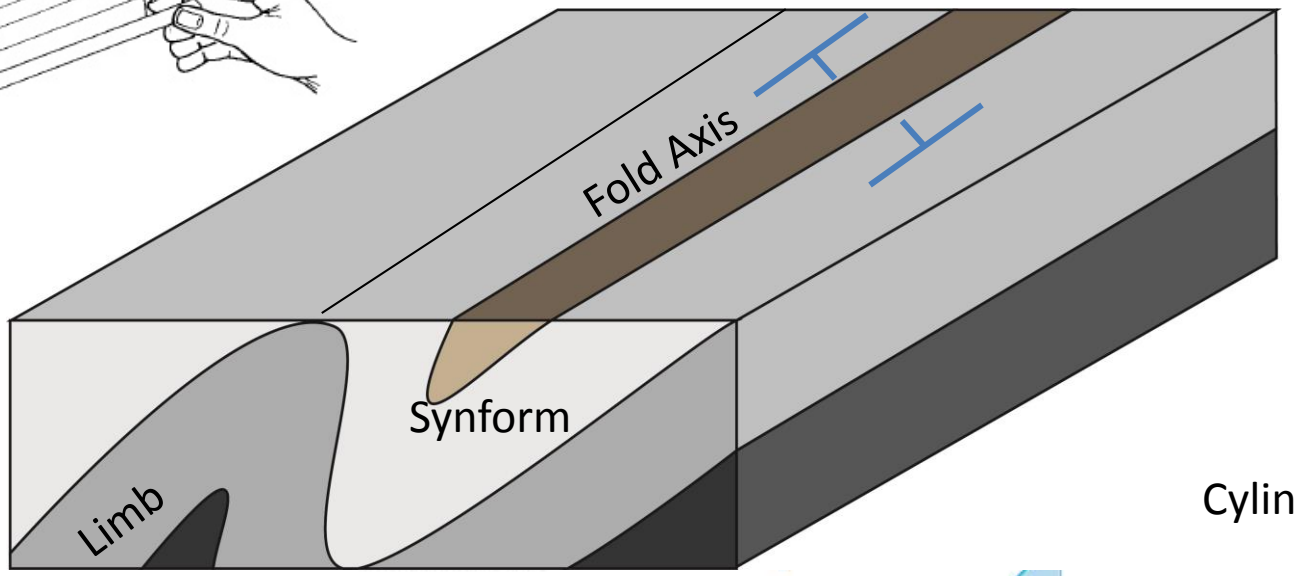
If the fold surface can be generated by moving a straight line parallel to itself, the surface is a cylindrical one.

The straight line is called the fold axis.





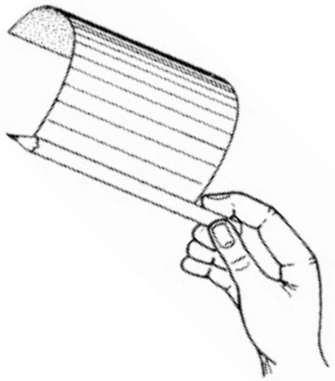


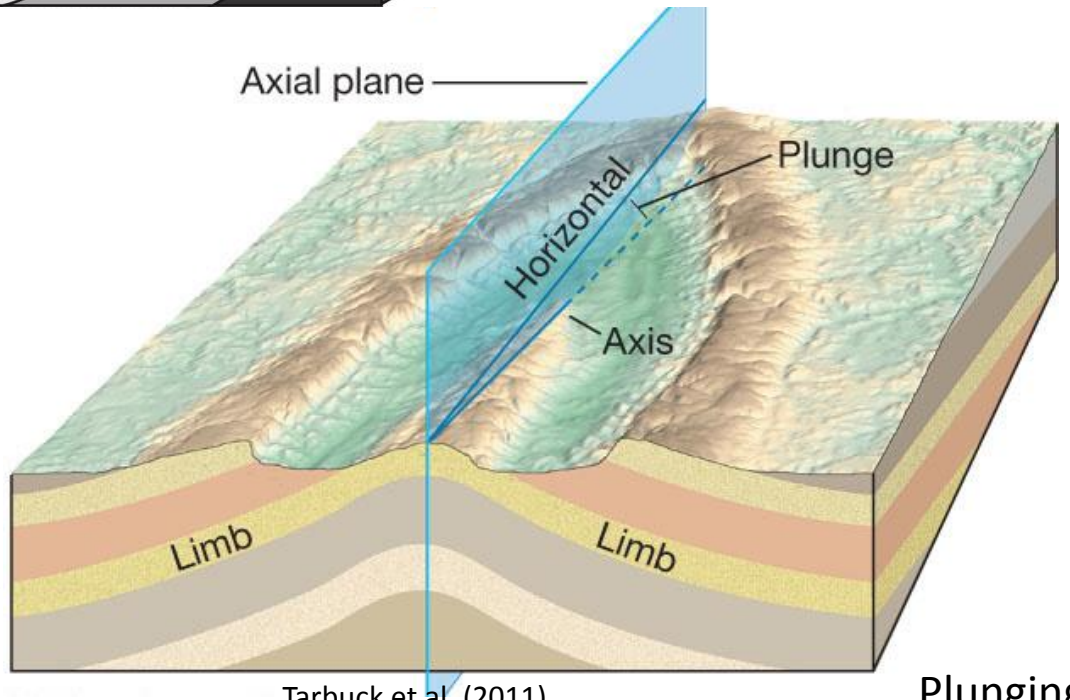


Horizontal fold axis

Cylindrical fold

Antiform

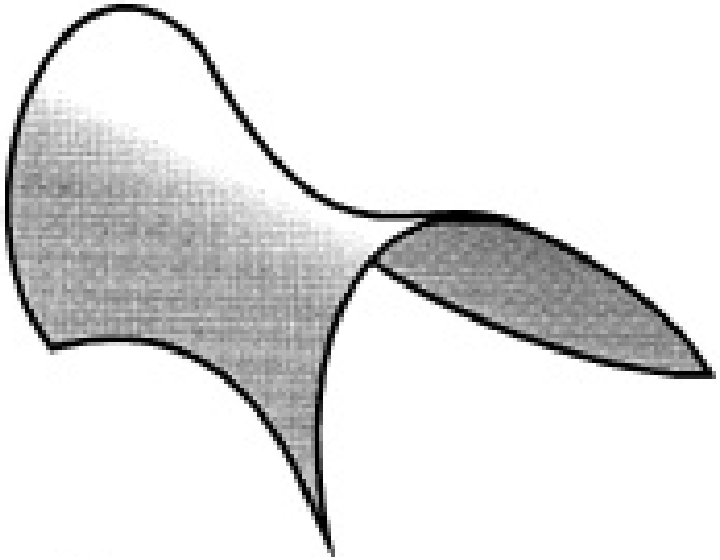


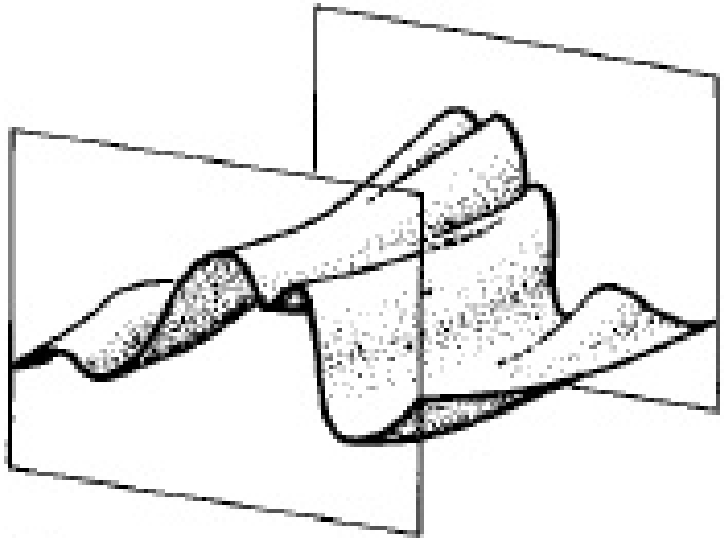


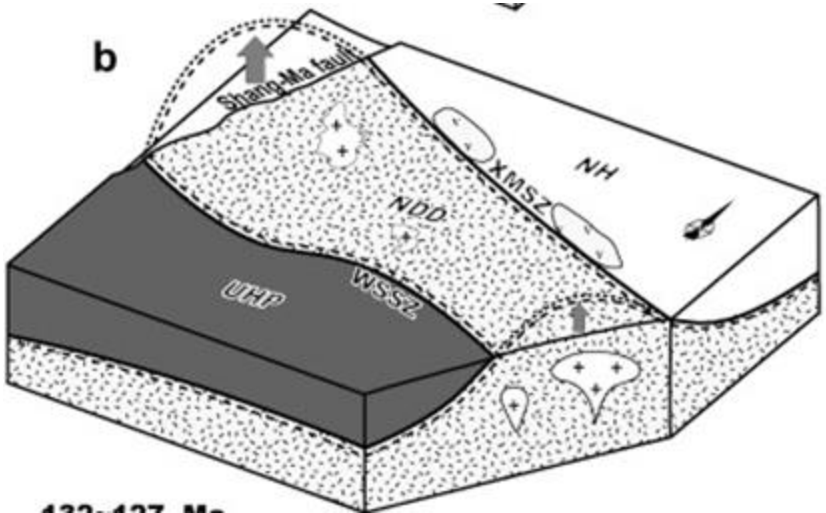
Tarbuck et al. (2011)

Plunging fold axis

Noncylindrical fold surface

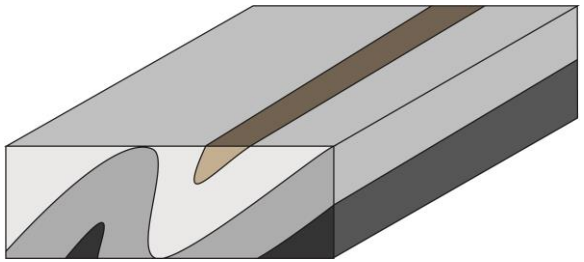


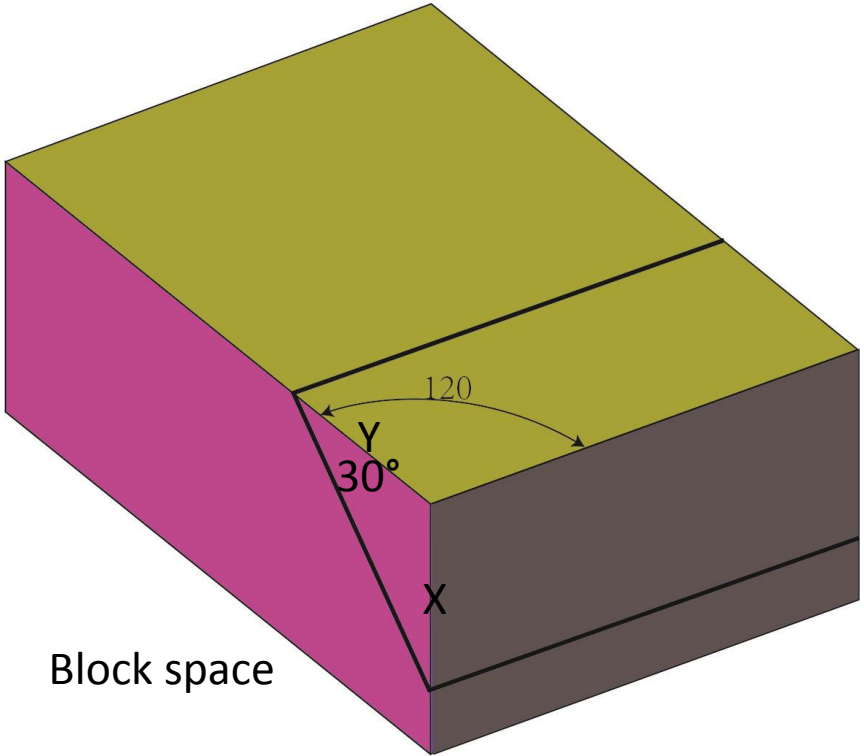




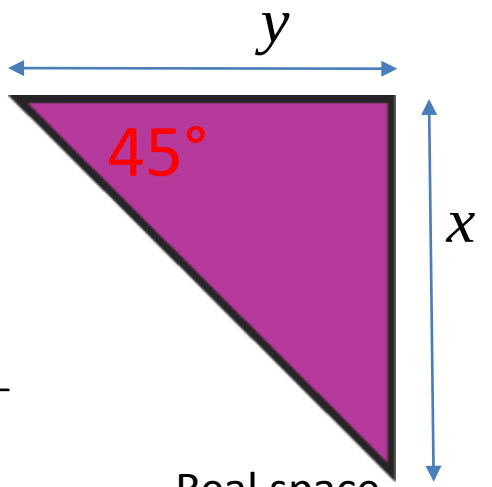
A cube/cuboid in real space

- **Isometric block diagram: Three edges of the block have the same scale and are 120 degrees from each other.**





Block space

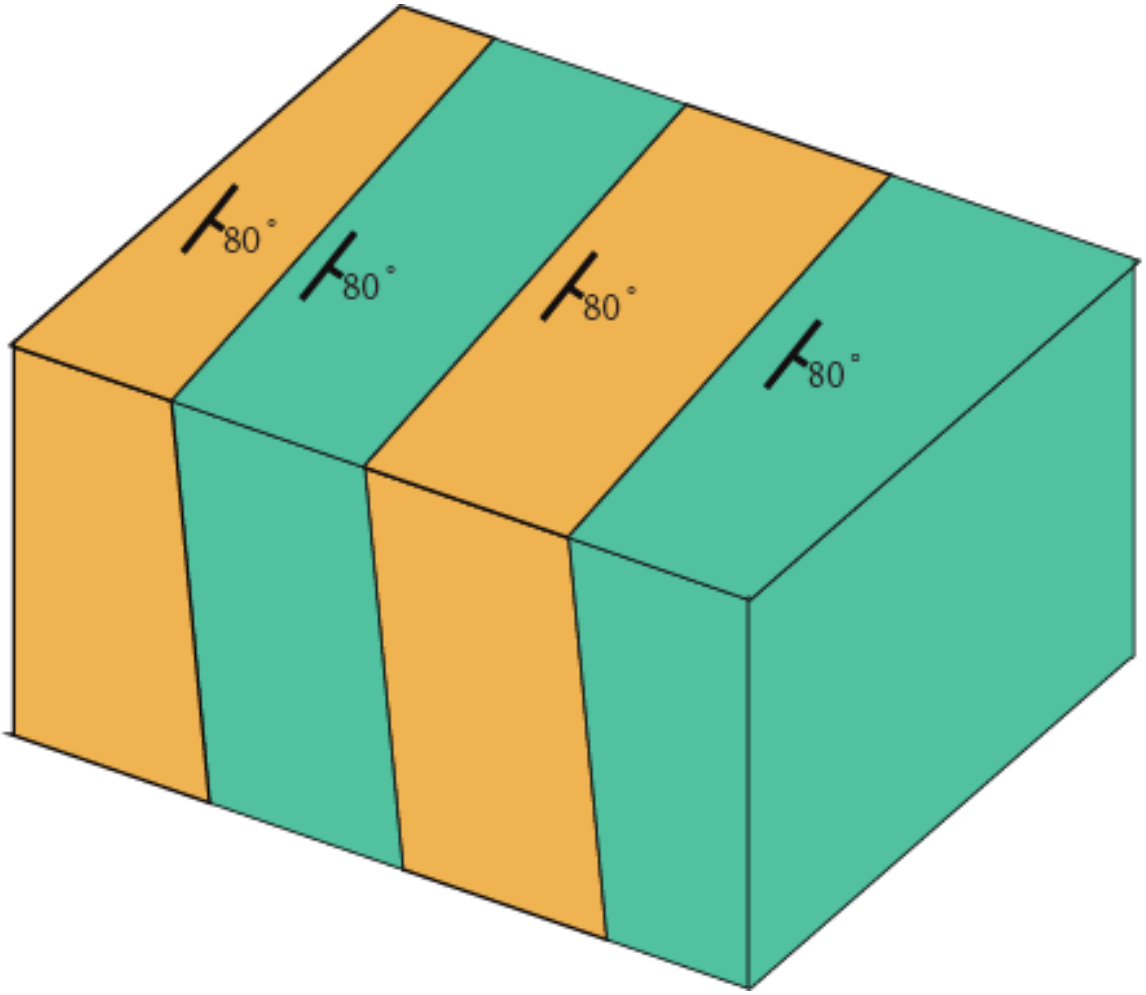


Real space

$$\tan 45^\circ = \frac{x}{y} = \frac{X}{Y}$$

$$X = Y \tan 45^\circ$$

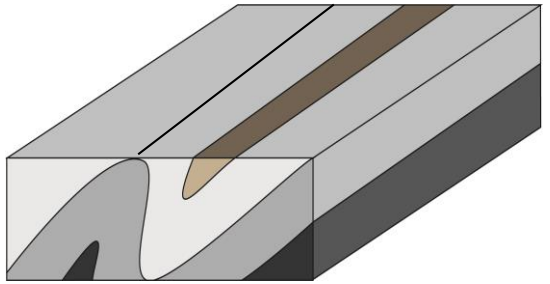
Uniformly dipping beds



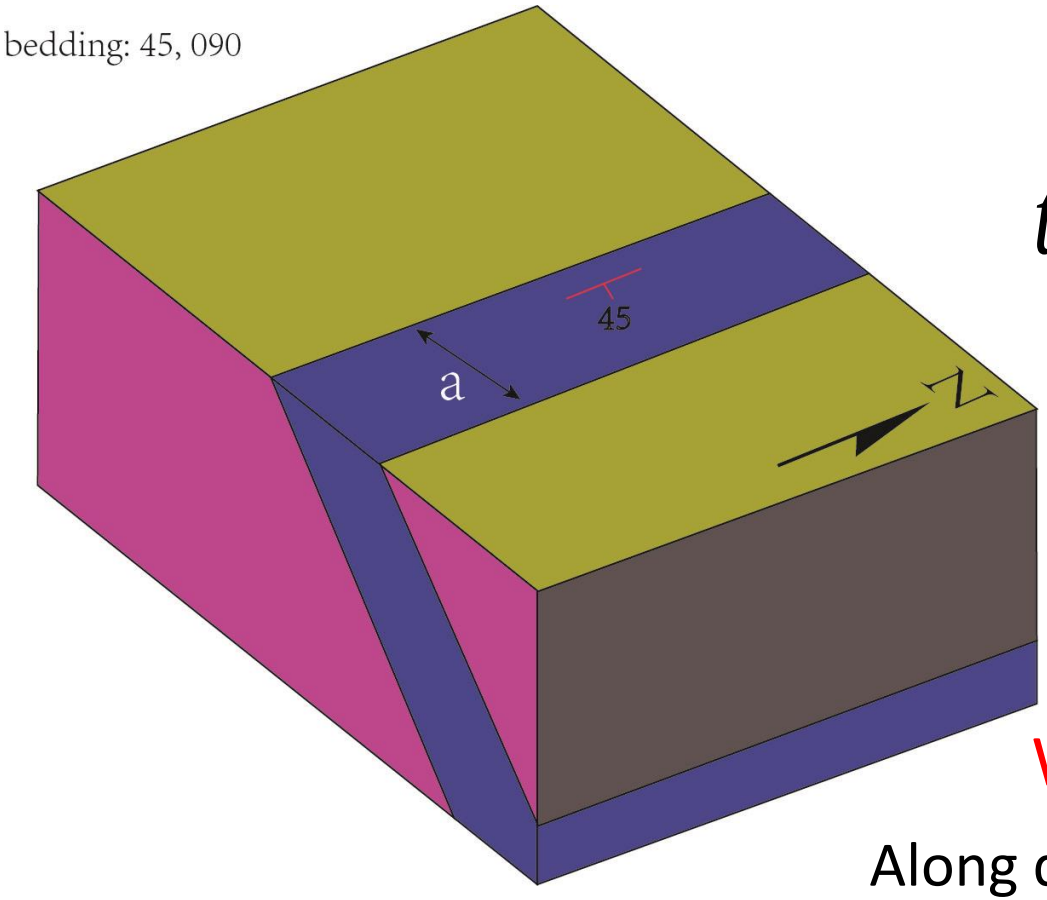
- Horizontal flat top face

  Long line: strike line
  Short tick: dip direction
  Dip is labeled by the short tick

- Trace of contact // strike line of bed on the horizontal flat top face



Thickness of bedding



Scale along edges: 1： 10,000

$$thickness = a \times \sin\alpha$$

$\alpha = 45°$ (Dip of the bed)

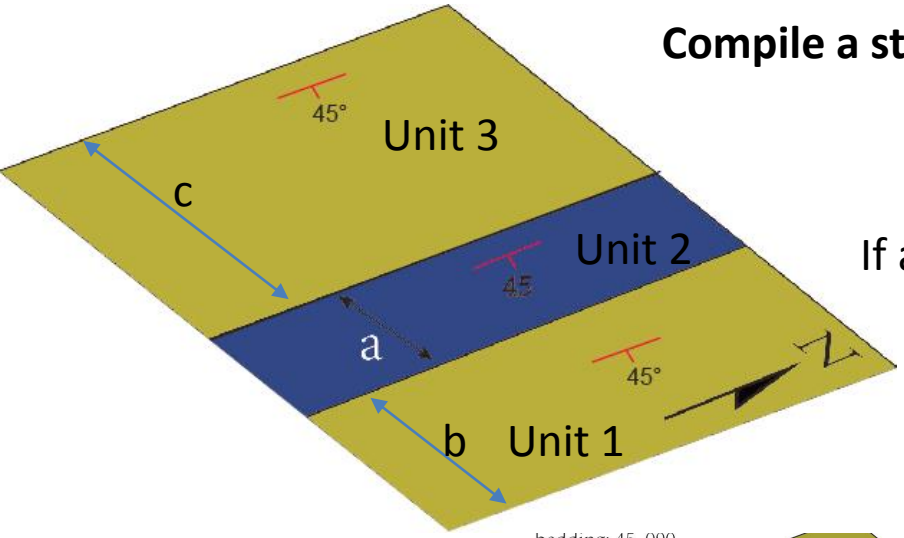
Where to measure a?

Along dip direction

Horizontal surface (along contour line)

Along a direction with known scale

Stratigraphic column



Horizontal flat surface

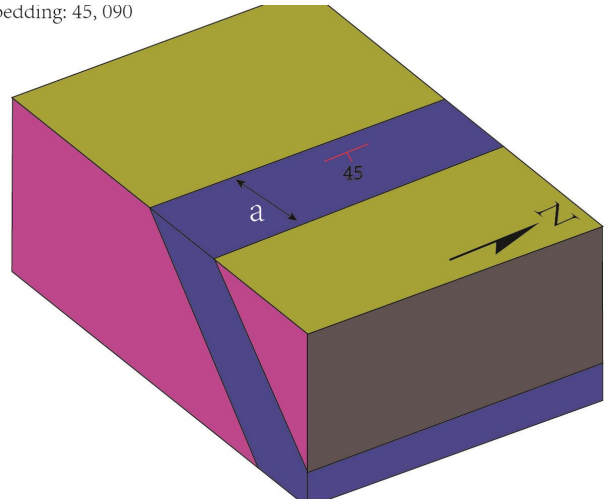
Compile a stratigraphic column

If age unknown, assume that beds are not overturned.

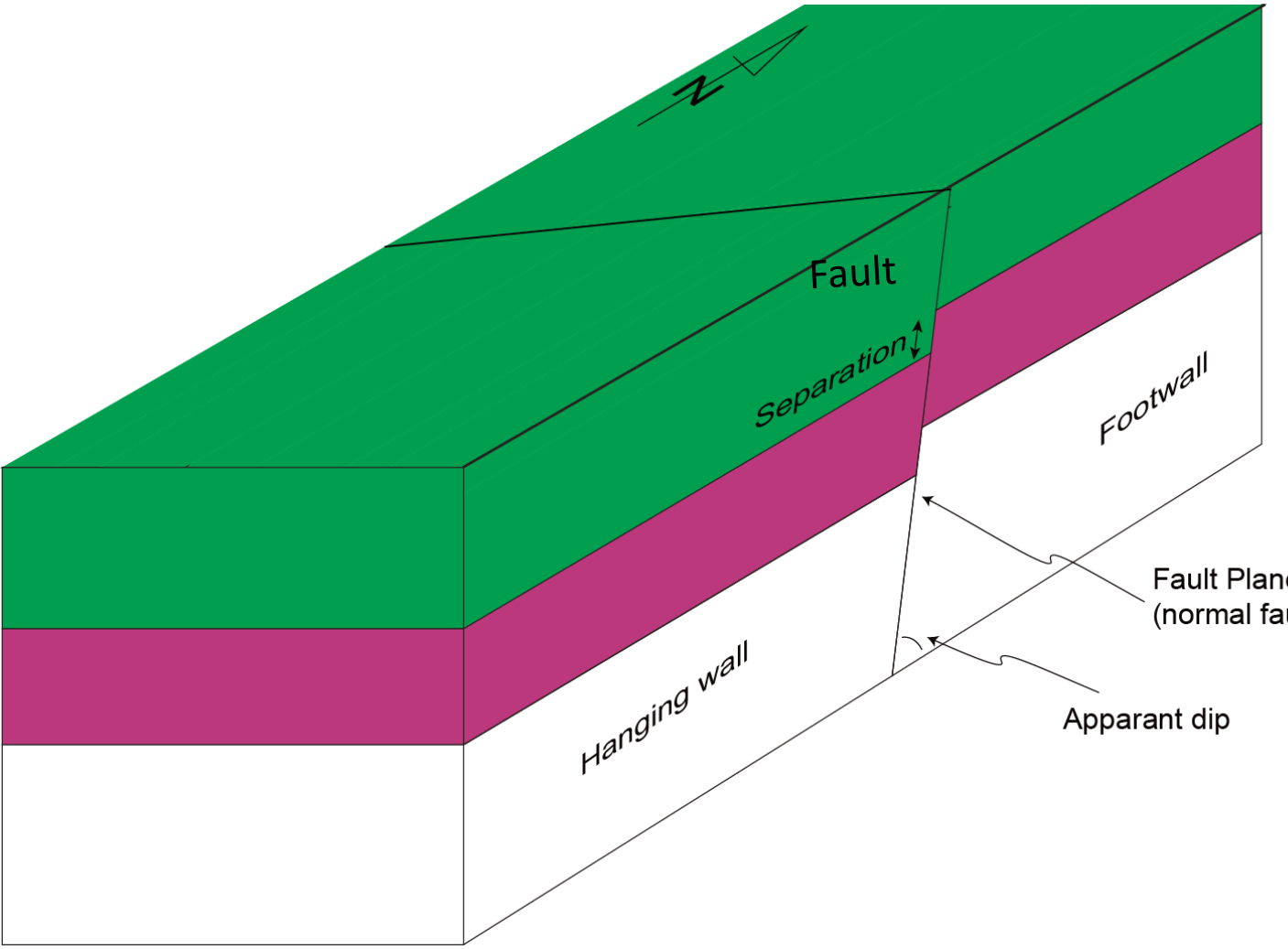
From top to bottom: Unit 1, unit2, unit3

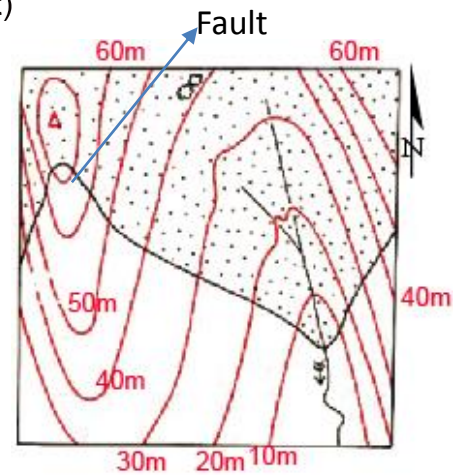
True thickness:

Unit1: ≥b*sin45°
Unit2: a*sin45°
Unit3: ≥ c*sin45°

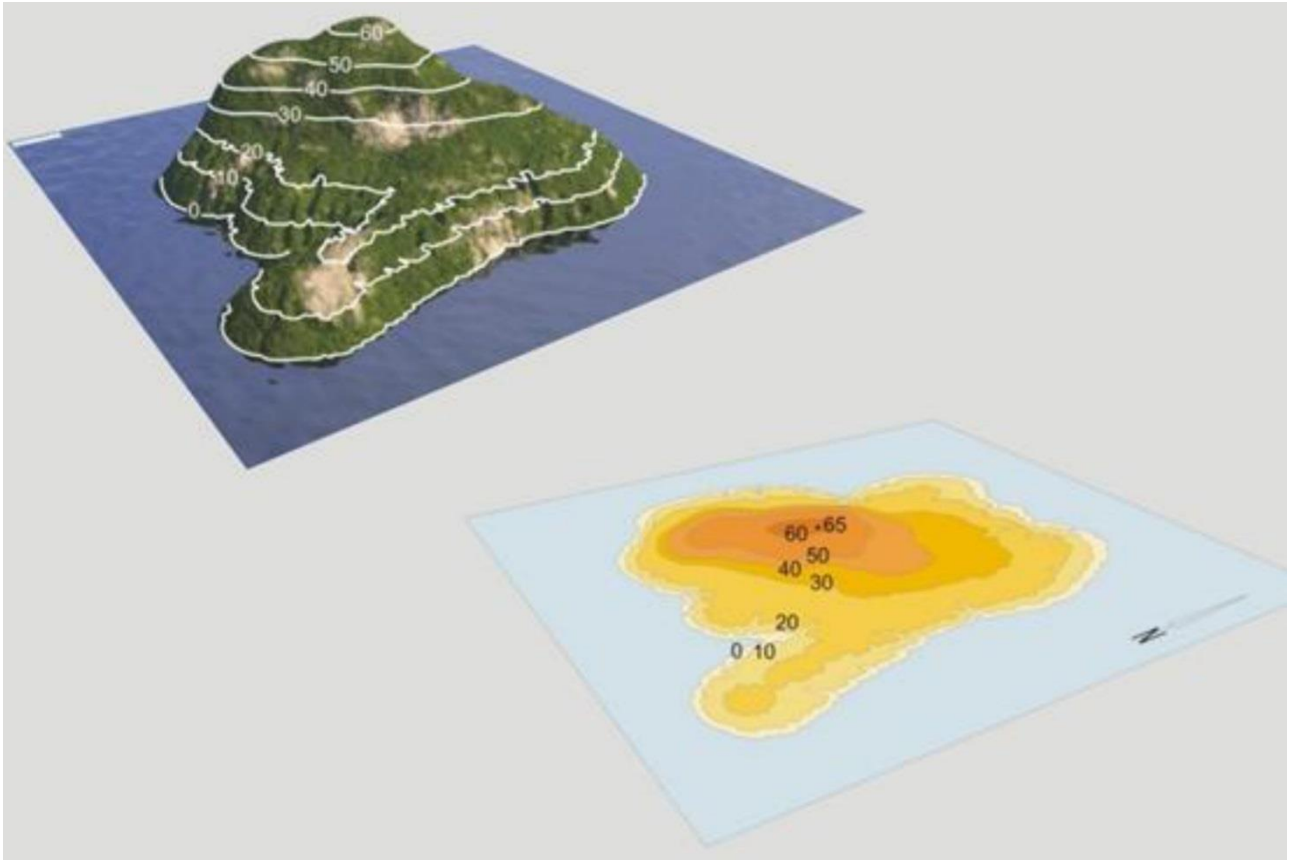


Block diagram showing a fault

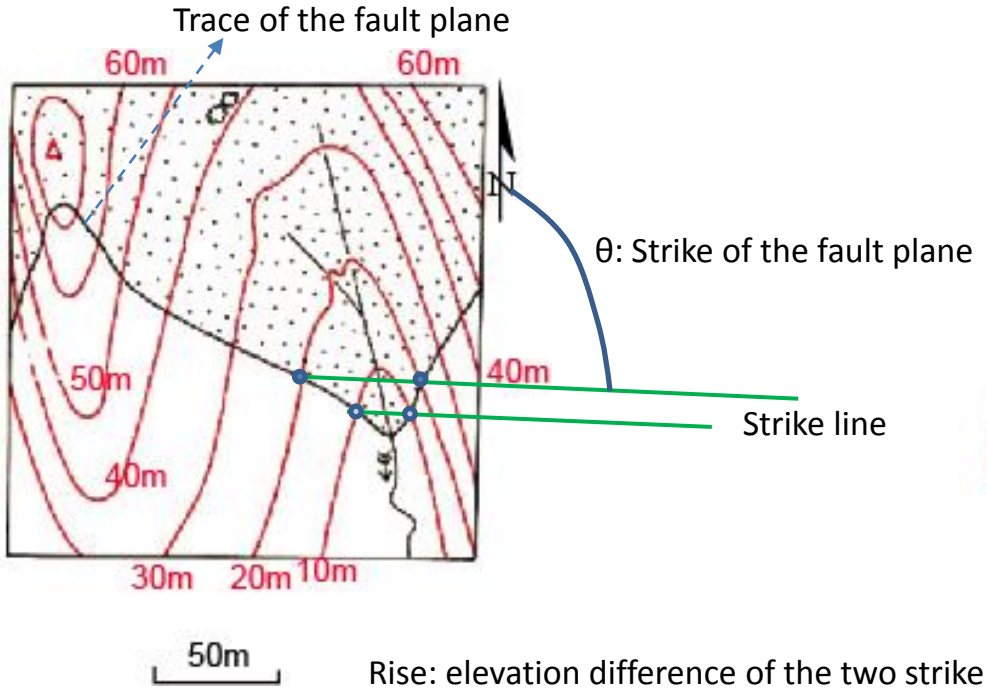


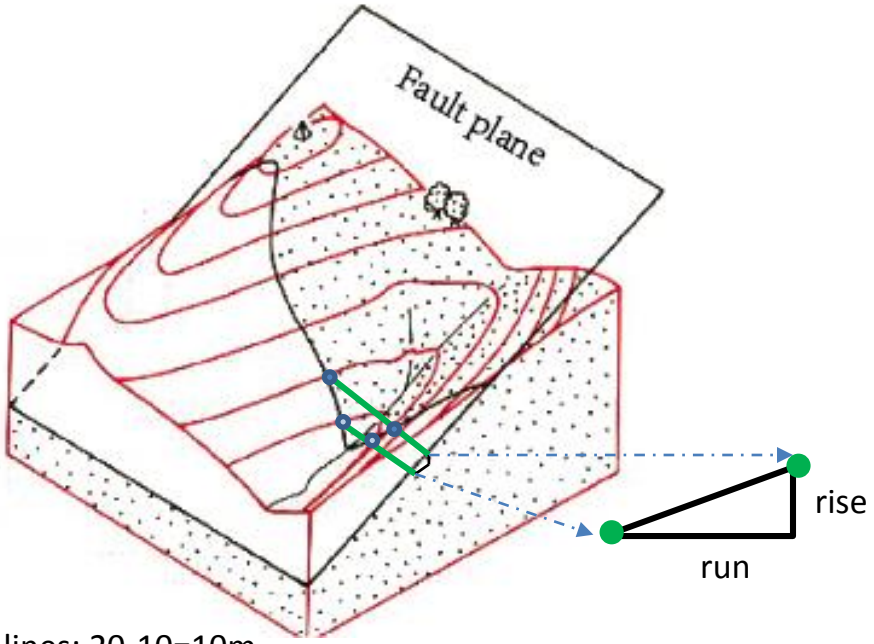


Contour lines



Determine strike and dip of planar structures from a topographic map





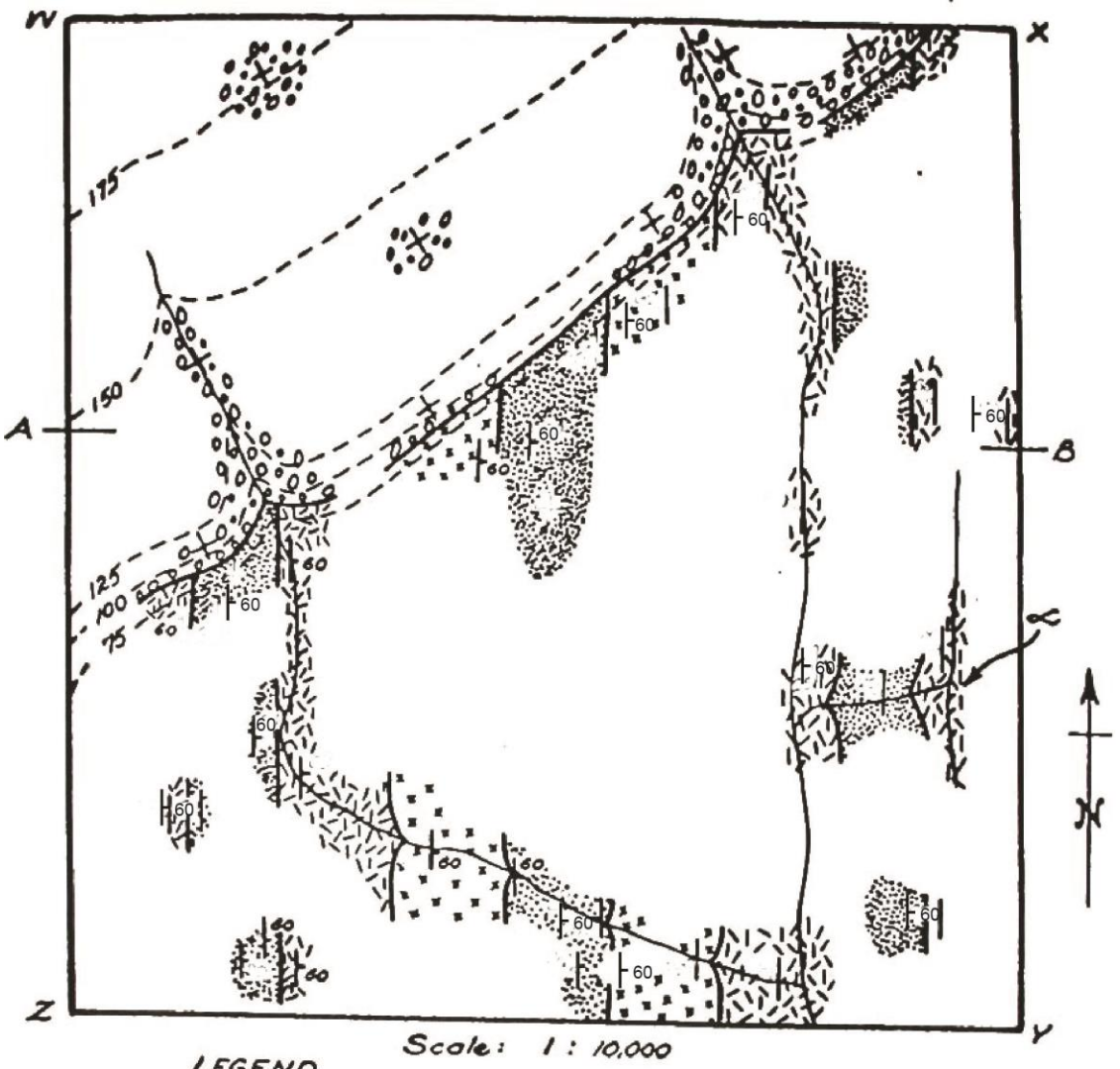
Rise: elevation difference of the two strike lines: 20-10=10m

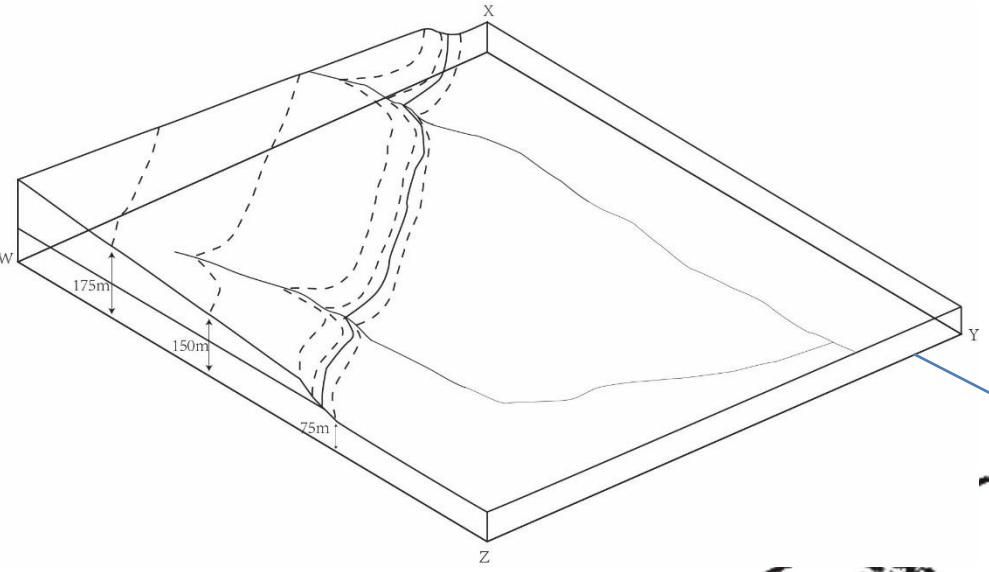
Run: Horizontal distance measured from the plan view map and converted to its distance in real space

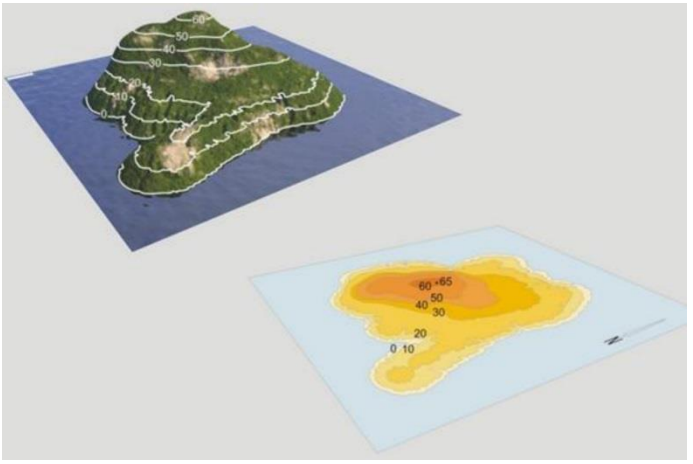
Dip: atan(rise/run)

How to construct a block diagram to show topography based on contour lines?

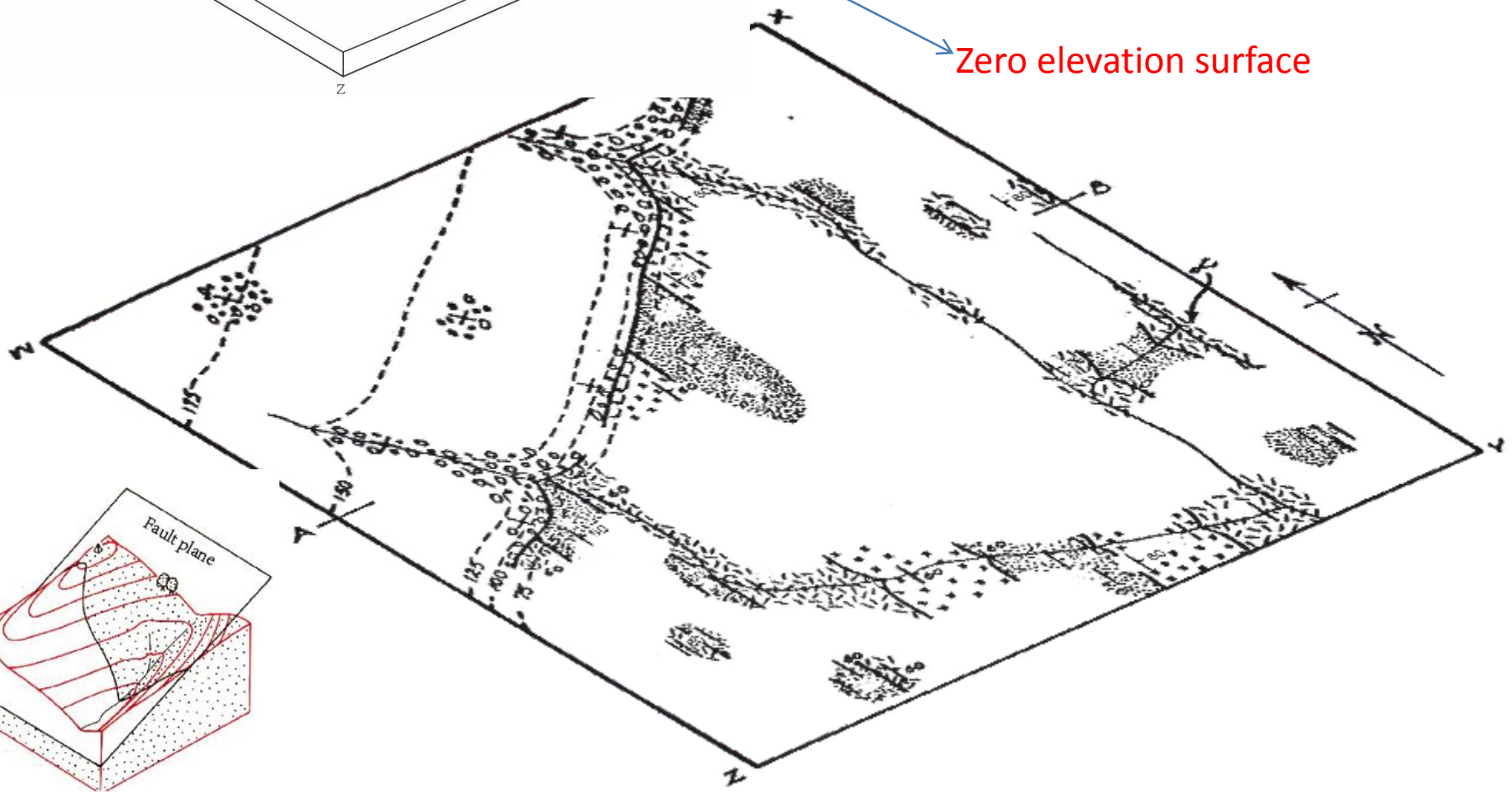
One example here

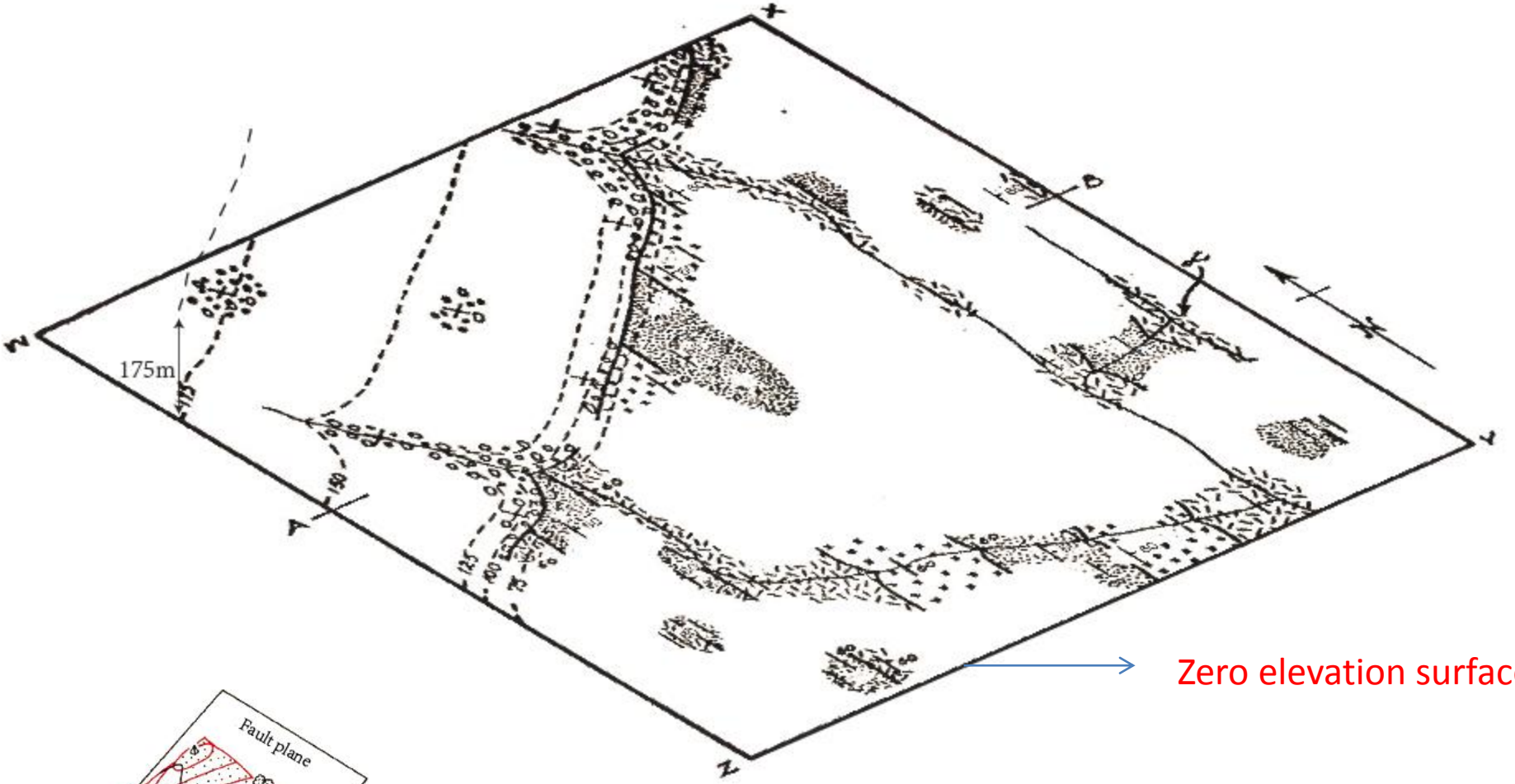

W
X
Z
Y
A
B
C
175
150
125
100
75
60
N
Scale: 1 : 10,000
LEGEND
Conglomerate
Limestone
Sandstone
Shale
Strike & dip of bedding
Horizontal bedding
Geological contact
Contour (interval 25 m.)

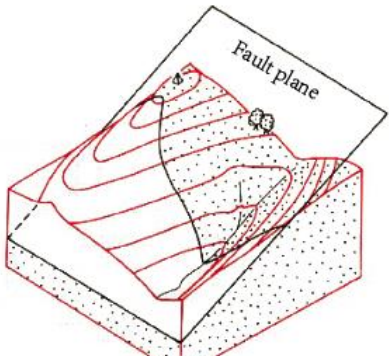


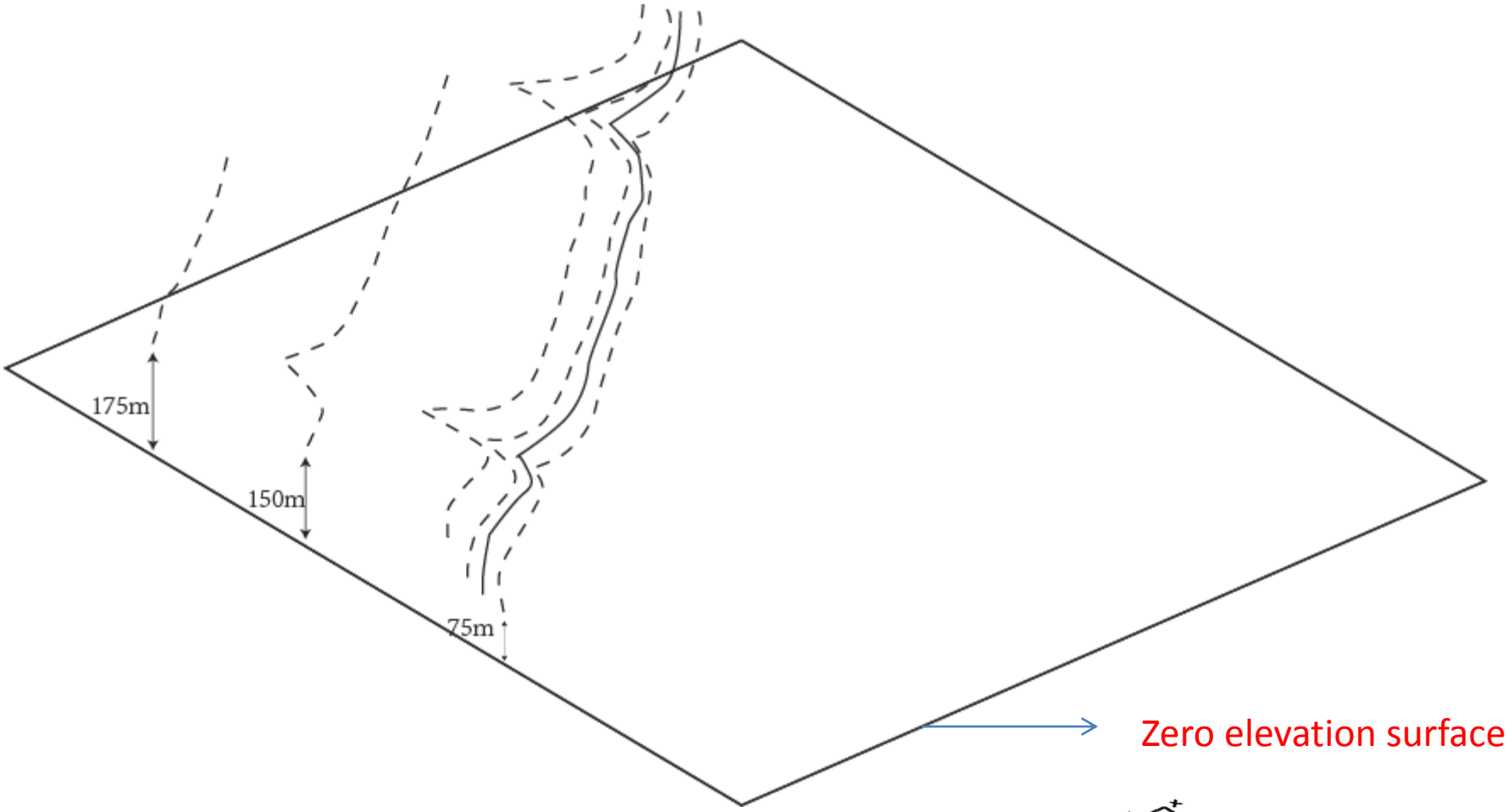


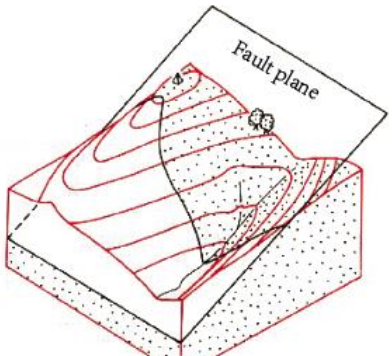
Zero elevation surface

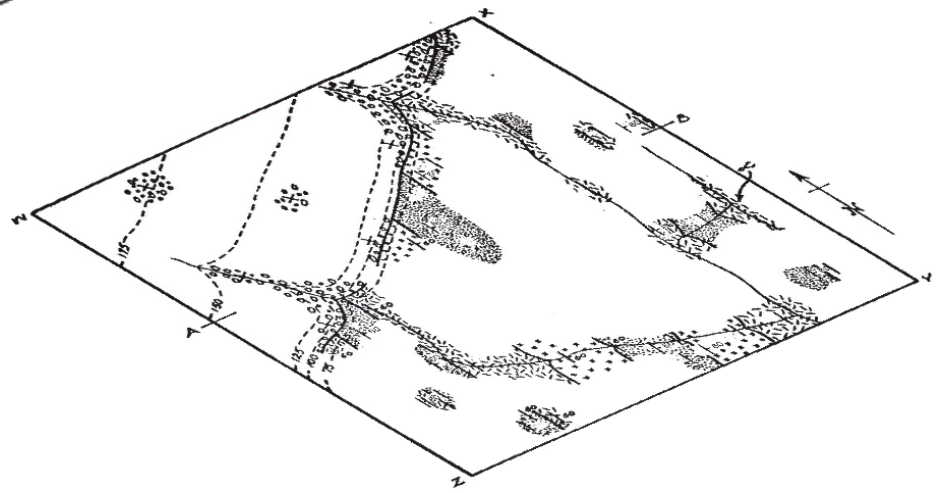


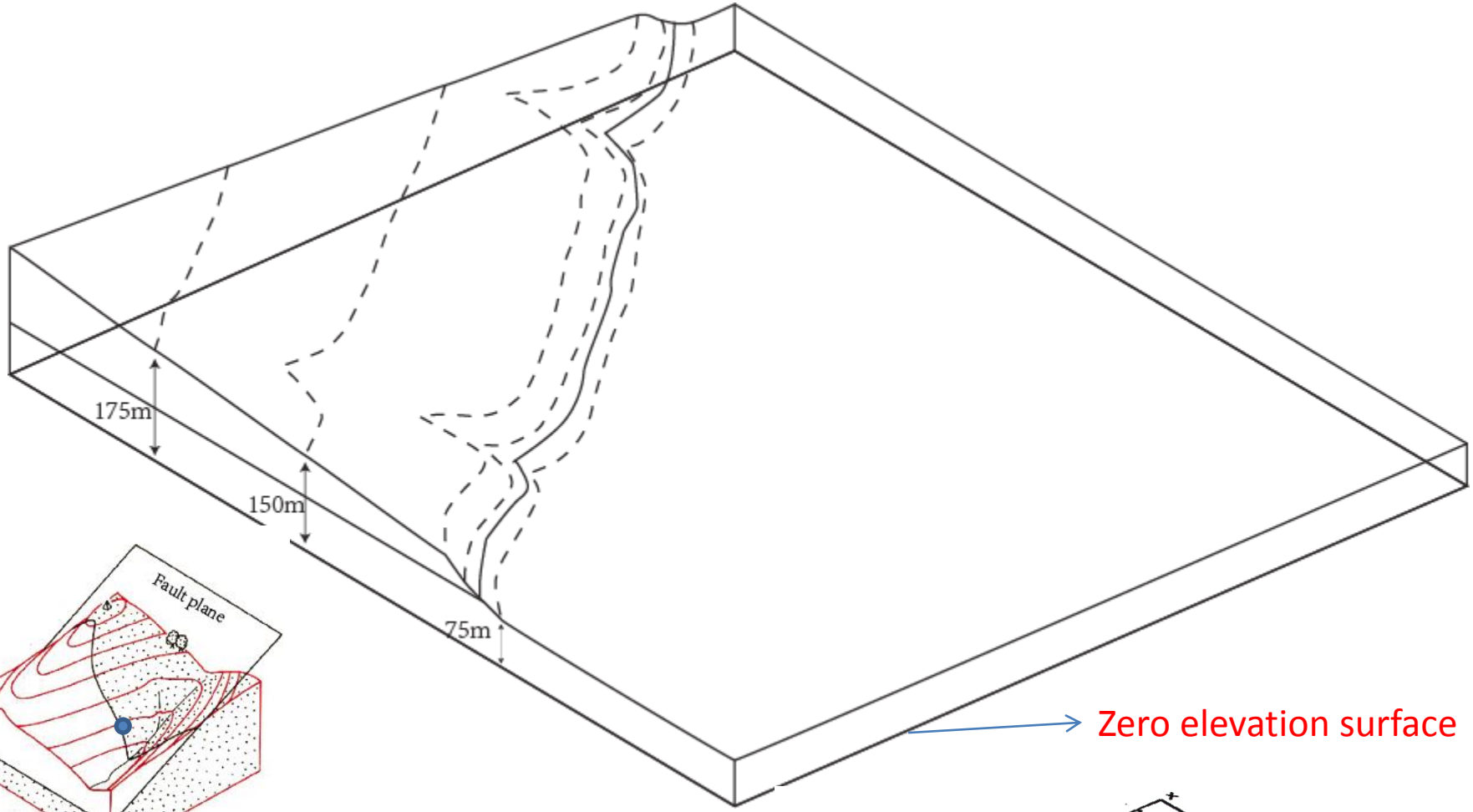

175m
Zero elevation surface


Fault plane

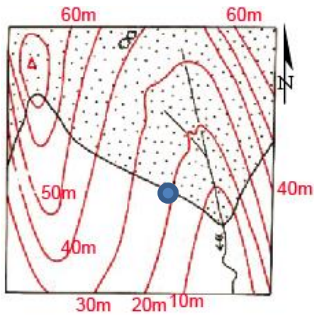

175m
150m
75m
Zero elevation surface

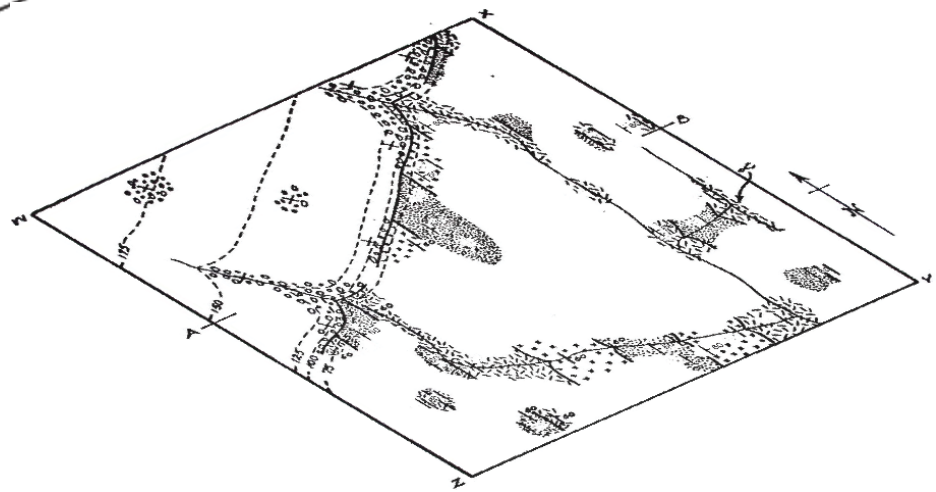

Fault plane

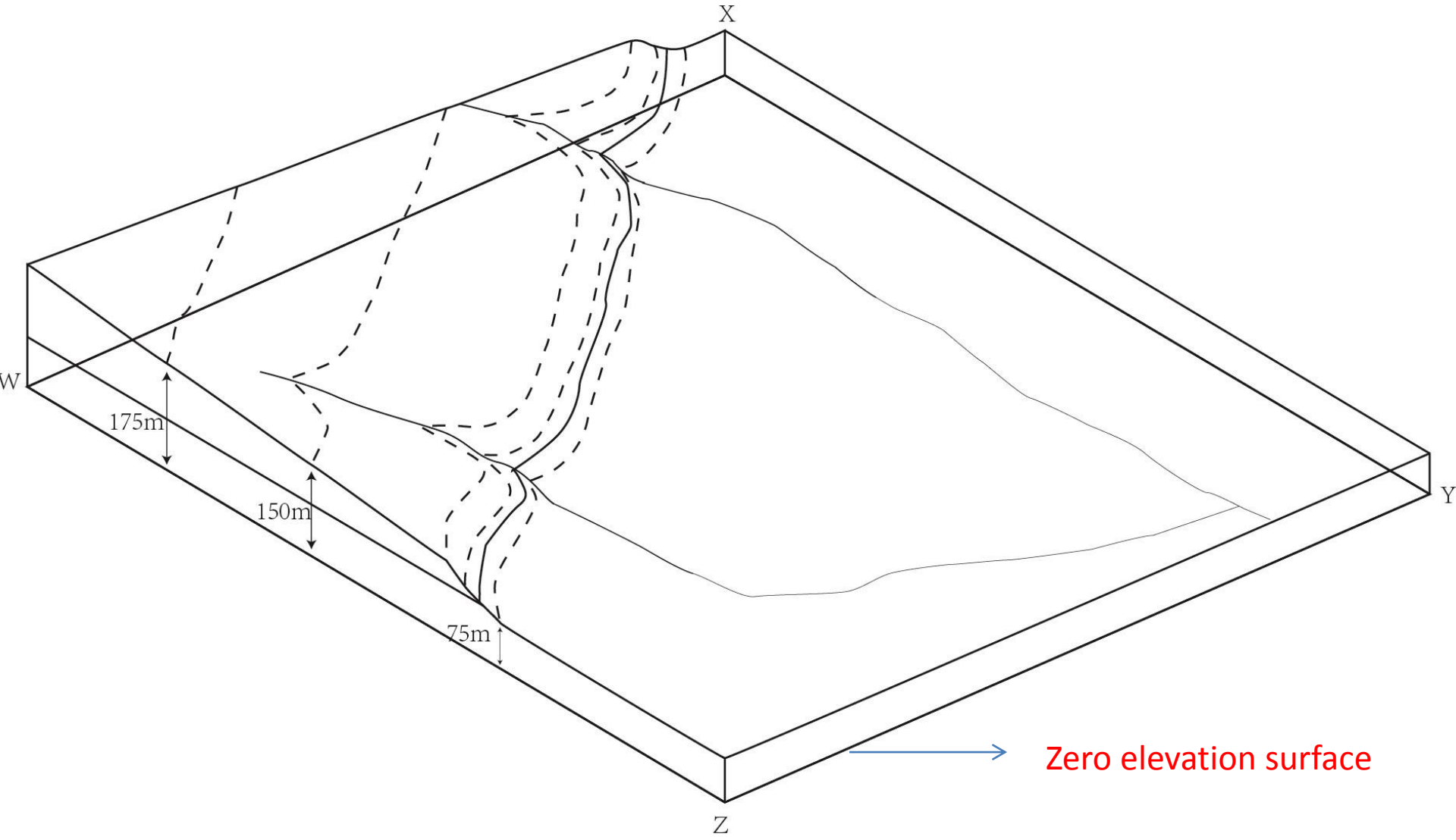




Zero elevation surface






X
W
175m
150m
75m
Y
Z
Zero elevation surface